Die Kompetenzmarke für Energiesparsysteme

Installation and operating instructions

Cascade module KM

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Part no. 30 62 449 Subject to modifications 03/09 GB

Safety instructions

The following symbols are used in conjunction with these important instructions concerning personal safety, as well as operational reliability.

"Safety instructions" are instructions with which you must comply exactly, to prevent risks and injuries to individuals and material losses.

Danger through 'live' electrical components. Switch OFF the ON / OFF switch before removing the casing.

Never touch electrical components or contacts when the ON / OFF switch is in the ON position. This results in a risk of electrocution that may lead to injury or death.

The main supply terminals are 'live' even when the ON / OFF switch is in the OFF position.

Note "Note" indicates technical instructions that you must observe to prevent material losses and boiler malfunctions.

Standards and regulations

The appliance and control accessories comply with the following regulations:

EC Directives

- 2006/95/EC Low Voltage Directive
- 2004/108/EC EMC Directive

EN Standards

- EN 60730-1
- EN 55014-2
- EN 60529

Installation / Commissioning

- According to DIN EN 50110-1, only qualified electricians may carry out the installation and commissioning of the heating control unit and connected accessories.
- Observe all regulations stipulated by your local power supply utility and all VDE or local regulations.
- DIN VDE 0100 regulations regarding the installation of high voltage systems up to 1 000 V
- DIN VDE 0105-100 operation of electrical systems

Warnings

- Never remove, bypass or disable safety and monitoring equipment.
- Only operate the system in perfect technical condition. Immediately remove / remedy any faults and damage that may impact on safety.
- Always ensure that cold water is mixed in with hot water, when the DHW temperature is set above 60 °C or when pasteurising at a temperature in excess of 60 °C (risk of scalding).

Maintenance / Repair

- Regularly check the perfect function of all electrical equipment.
- Only qualified personnel may remove faults or repair damage.
- Only replace faulty components or equipment with original Wolf spare parts.
- Always maintain prescribed electrical protection values (see specification).

Note Any damage or loss resulting from technical modifications to Wolf control units is excluded from our warranty.

Terminology

Header temperature

The header temperature is the flow temperature in the header downstream of the low loss header. The header temperature therefore corresponds to the heating water temperature of heating systems equipped with a gas fired boiler.

Heating water temperature

The heating water temperature is the radiator flow temperature. The higher the heating water temperature, the higher the heat transfer to radiators.

Mixer circuit temperature

The mixer circuit temperature is the flow temperature downstream of the mixer, with which underfloor heating systems are supplied.

Cylinder heating

Heating up a DHW cylinder.

Heating program

Subject to program selection, the heating time program switches from heating to economy mode or from heating mode to heating OFF and vice versa.

Domestic hot water program

The DHW time program switches "Enable DHW cylinder heating" ON and OFF.

Winter mode

Central heating and DHW according to the heating and DHW time program.

Summer mode

Central heating OFF, DHW according to the DHW time program.

Heating mode / Setback mode

In winter mode, two heating water temperatures can be selected, i.e. standard room temperature and setback temperature. In the latter case the temperature will be reduced to the setback temperature.
The heating program changes over between heating and setback mode.

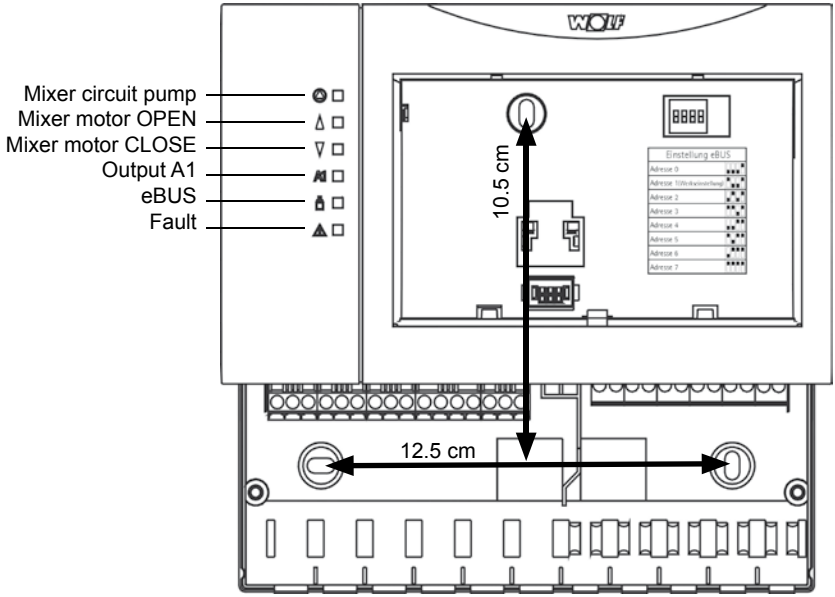
Abbreviations

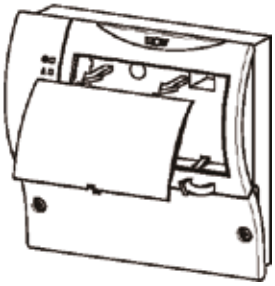
SAF - Header sensor
BPF - Bypass sensor
MKF - Mixer circuit sensor
PF - Buffer sensor
PK - Zero volt contact
RLF - Return sensor
SPF - Cylinder sensor
VF - Flow sensor
BS - Boiler sensor
StE - Fault message input (PK as N/O)
0-10 V - Voltage input for ext. demand
MKP - Mixer circuit pump
MM - Mixer motor or mixer module
SPLP - Cylinder primary pump
LP - Primary pump
BPP - Bypass pump
3WUV - Three-way diverter valve
StA - Fault message ouput (PK as N/C)
CIR. - DHW circulation pump
HKP - Heating circuit pump

Appliance description

The cascade module (KM) comprises a cascade control for switching and modulating boilers. Only boilers of the same type (single stage, two-stage or modulating) and of the same output may be linked in a single cascade. The active boilers transfer the generated heat into the low loss header or the heating system headers, whereby the heat is captured by the header sensor, the so-called common flow sensor of the heating system.
The KM module also comprises a mixer circuit control and the control for a programmable output. The mixer circuit controller can be used for the heating flow as well as for the heating return. The programmable output either regulates a direct heating circuit, a cylinder circuit, a convector heater (= ext. heat demand), or a three-way diverter valve for raising the return temperature (= central heating backup). The outputs for the mixer circuit control can also be configured as DHW circulation pump and fault message output. Subject to application, select the relevant combination of mixer circuit controller or outputs and the programmable output as configuration.
For connection to telecontrol systems, the KM offers a 0 to 10 V input with which to control the boilers. With this configuration only the fault message output is still enabled.
Parameters can be changed and sensor values can be displayed at the programming module (BM) or at ISM1 with WRS-Soft. The KM features an eBUS interface (2-wire communication BUS) and can therefore be integrated into the Wolf control system.

Installation, cascade module





- Remove the cascade module from its packaging.
- Fitting directly to the wall.
- Connect one outside temperature sensor to boiler 1 (address 1; boiler addressing, see page 26); alternative connection options see under "Electrical connection / Outside temperature sensor".
- Install the outside temperature sensor at a north or north eastern wall at a height of 2-2.5 m from the ground (cable grommet pointing downwards).
- Wire the cascade module KM in accordance with the installation diagram.
  Cable cross-section for 230 V min. 0.75 mm²; for 24 V min. 0.5 mm².

Note: Never route on-site leads for outside temperature and flow temperature sensors together with mains cables.

Maximum thermostat

When connecting the maximum thermostat at the "Max TH" terminals of the KM, only the mixer circuit pump will be stopped in case of faults (mixer no longer closes).

Without a maximum thermostat, extremely high temperatures may occur in the underfloor heating circuit, should the KM develop a fault. This can result in the floor developing cracks. If with the configurations 1, 2, 3, 4, 5, 7, 8 and 13 no maximum thermostat is connected, plug a 3-pole Rast5 plug with jumper in its place.

Fault message input

With all configurations except configuration 5, the grey 2-pole plug with jumper must be plugged into input "E2" if the fault input is not used.

Outside temperature sensor

There are four options for integrating an outside temperature sensor into a system:

a) Outside temperature sensor at boiler 1 (address 1) at terminal AF, part no. 2792021.
b) Outside temperature sensor at BM (address 0) in the wall mounted base at terminal 5/6, part no. 2792021.
c) Radio clock module with outside temperature sensor connected to the eBUS, part no. 2792325.
d) Wireless outside temperature sensor and radio receiver connected to the eBUS, part no. 2744081 and 2744209.

Recommended cables and minimum cable cross-sections:

H05VV 3x1.0 mm²	power cable
H05VV 3x0.75 mm²	mixer circuit pump
H05VV 3x0.75 mm²	max. thermostat, three-way diverter valve
H05VV 4x0.75 mm²	mixer motor
H05VV 2x0.5 mm²	BUS cable

Note:

During service work, isolate the entire system from the power supply, otherwise there will be a risk of electrocution.

Configuration overview

Subject to the application of the KM, 13 different system versions are available. The different versions can be set with the configuration parameter (KM01).
This is found at control level 2 → Contractor → Cascade

Configuration 01: Mixer circuit and cylinder circuit; page 10

Configuration 02: Mixer circuit and convector heater circuit; page 11

Configuration 03: Mixer circuit and heating circuit; page 12

Configuration 04: Cylinder circuit and third party boiler control, page 13

Configuration 05: Mixer circuit and return temperature raising for central heating backup; page 14

Configuration 06: Heating circuit and return temperature raising for soft starting, page 15

Configuration 07: Mixer circuit with indirect return temperature raising for soft starting; page 16. Applies exclusively to systems comprising mixer circuits.

Configuration 08: Mixer circuit (factory setting); page 17

Configuration 09: Heating circuit; page 18

Configuration 10: Cylinder circuit; page 19

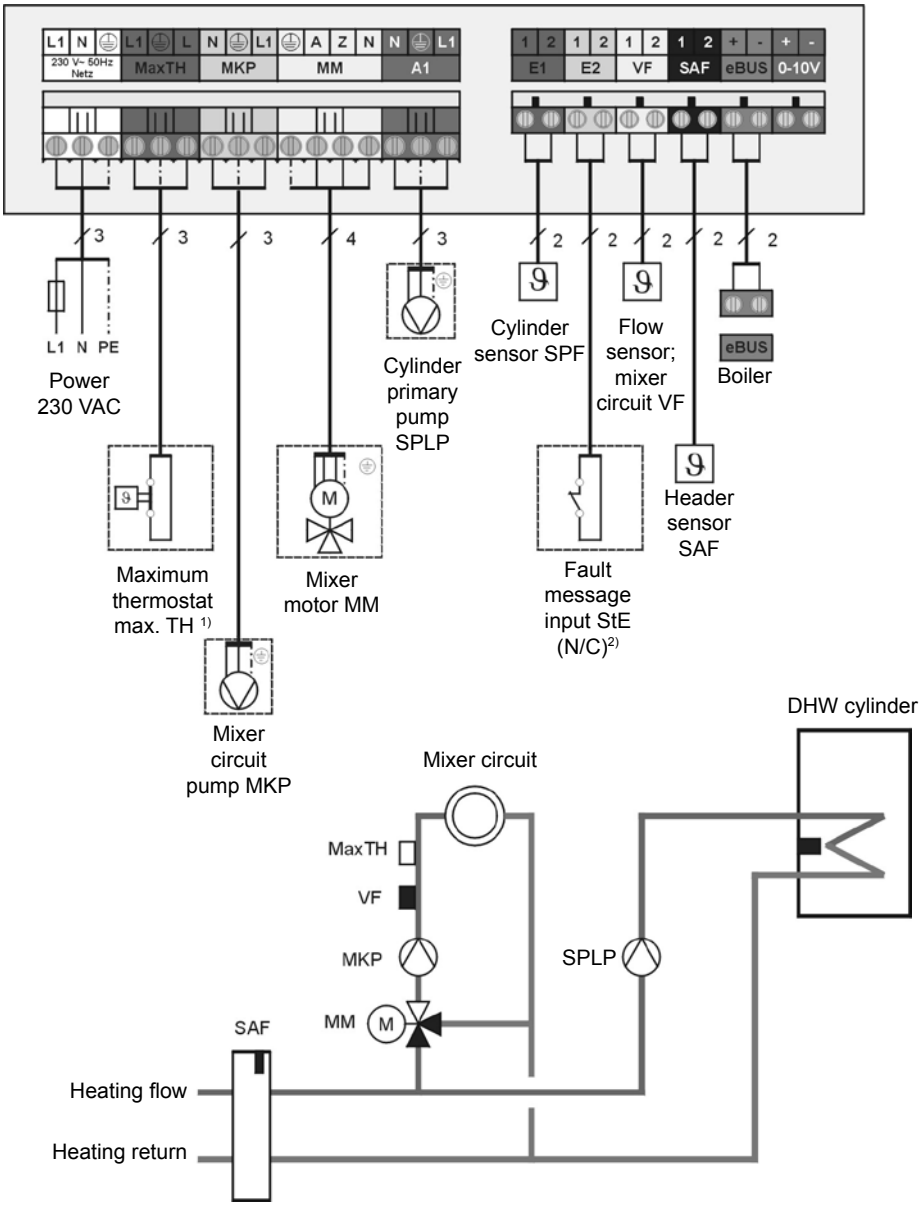
Configuration 11: Convector heater circuit; page 20

Configuration 12: 0 – 10 V input for telecontrol system, page 21

Configuration 13: Return temperature raising, wood burning boilers; page 22

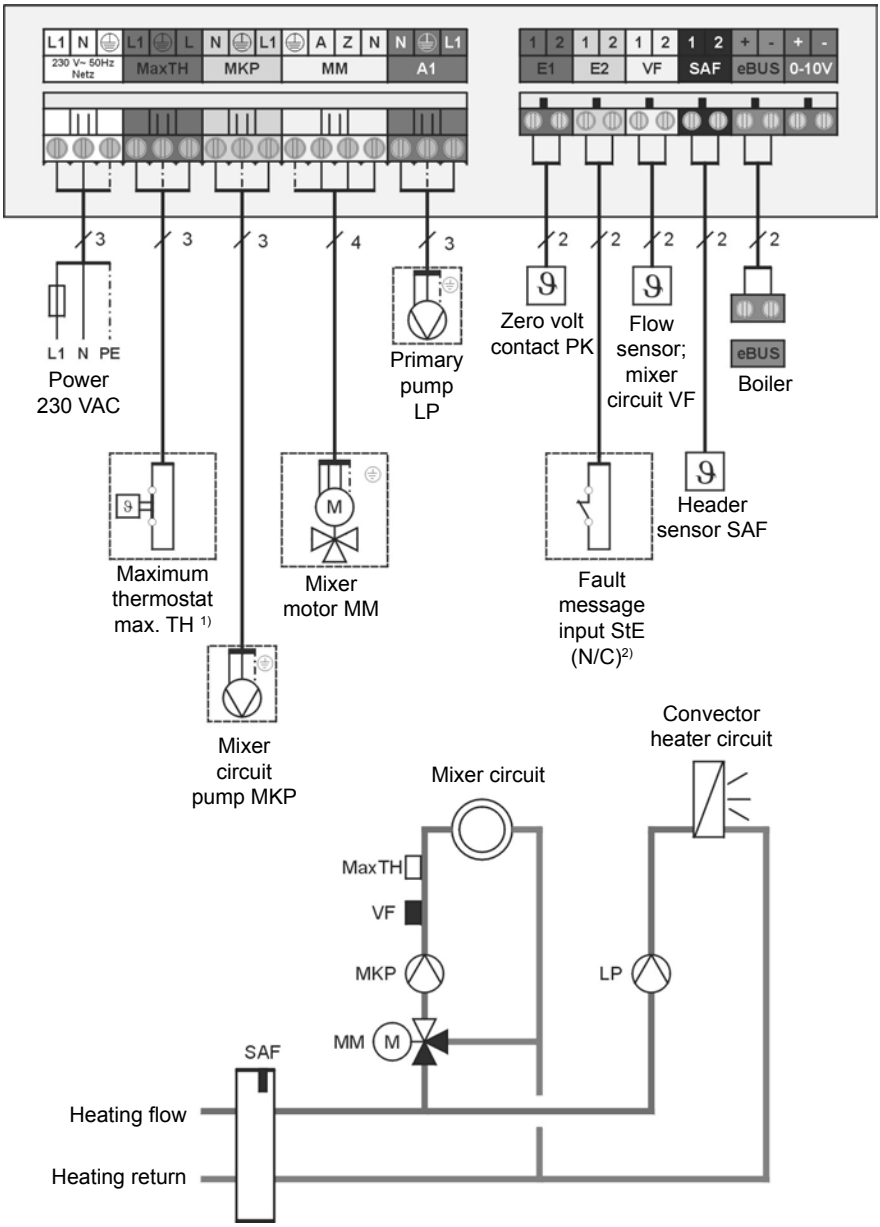
Note: **Restart the system after every configuration change (mains "OFF"/mains "ON").**

Configuration 1: Mixer circuit and cylinder circuit



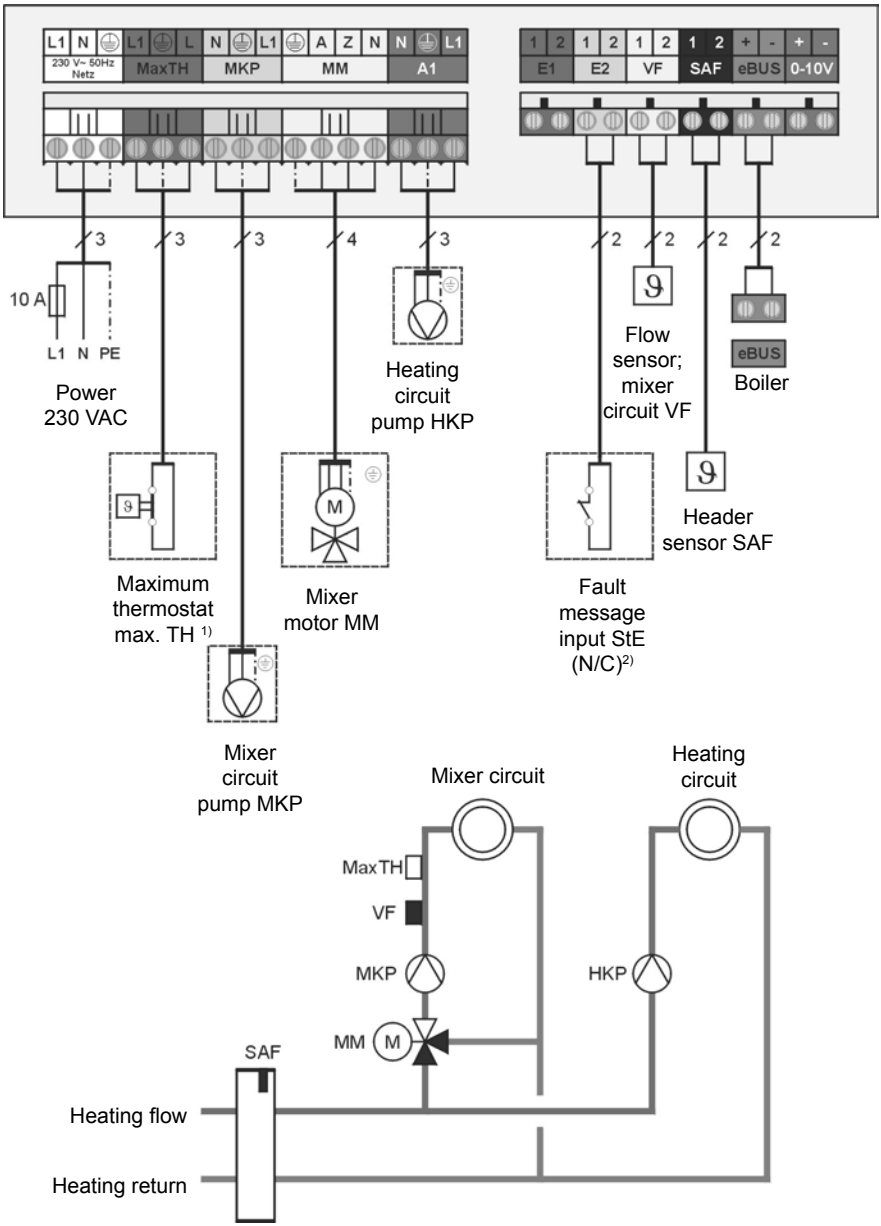
1) see description "Maximum thermostat" page 8
2) see description "Fault message input" page 8

Configuration 2: Mixer circuit and convector heater circuit



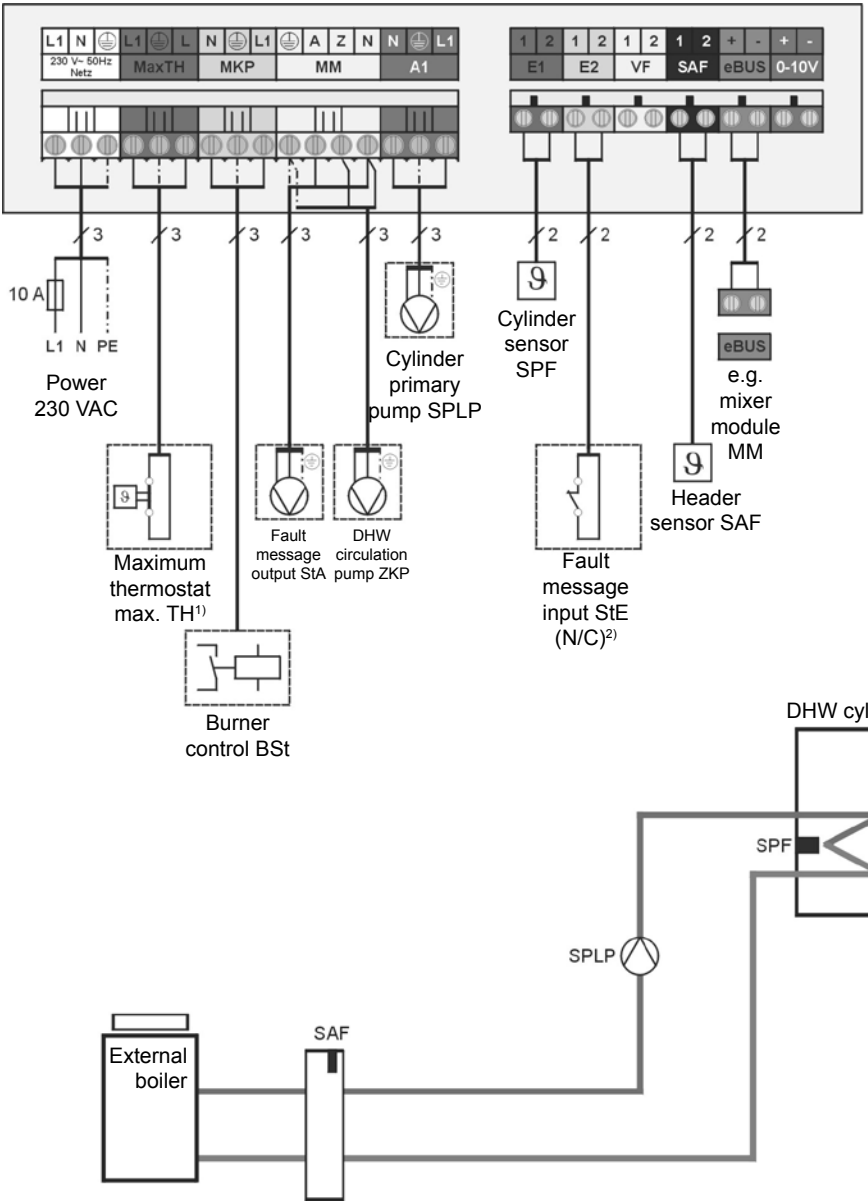
1) see description "Maximum thermostat" page 8
2) see description "Fault message input" page 8

Configuration 3: Mixer circuit and heating circuit



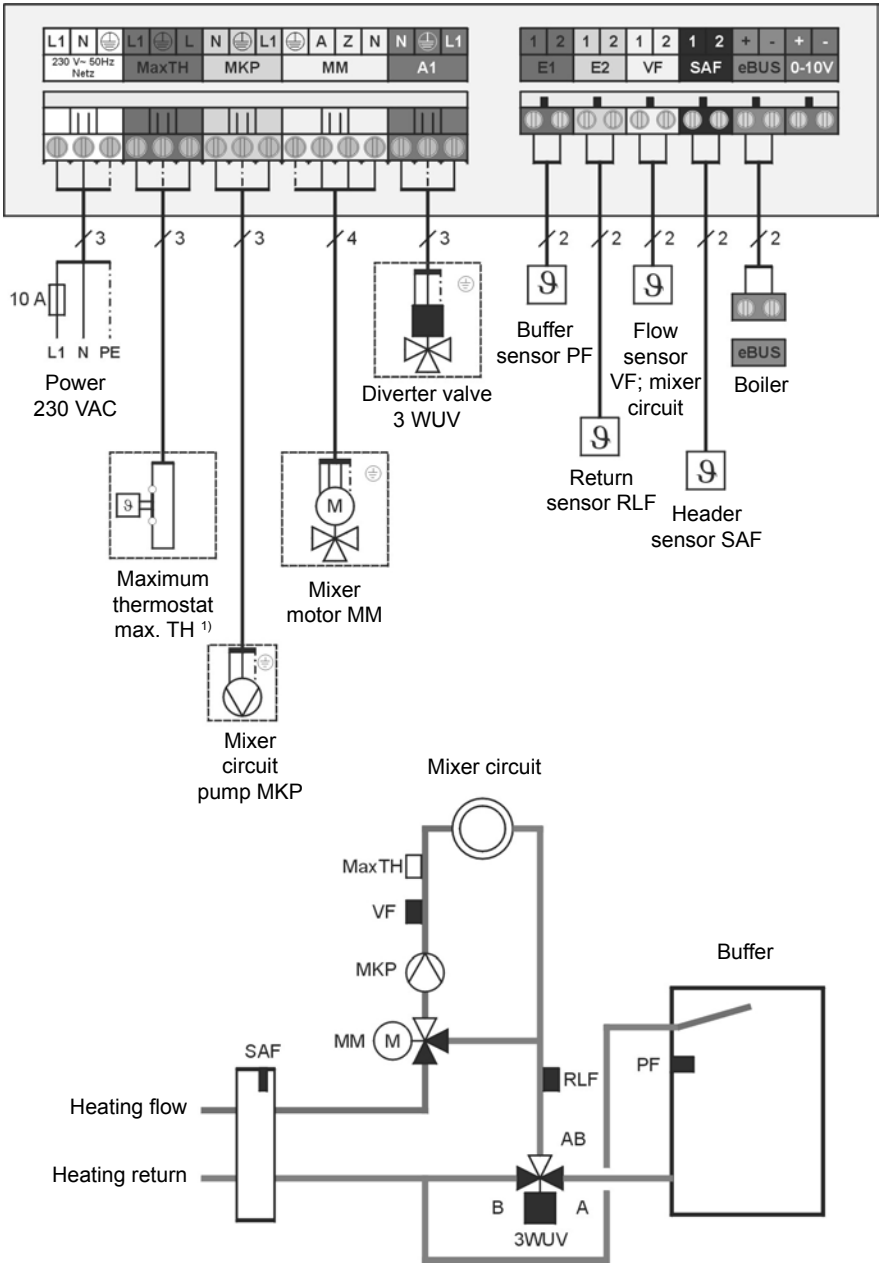
1) see description "Maximum thermostat" page 8
2) see description "Fault message input" page 8

Configuration 4: Cylinder circuit and third party boiler control



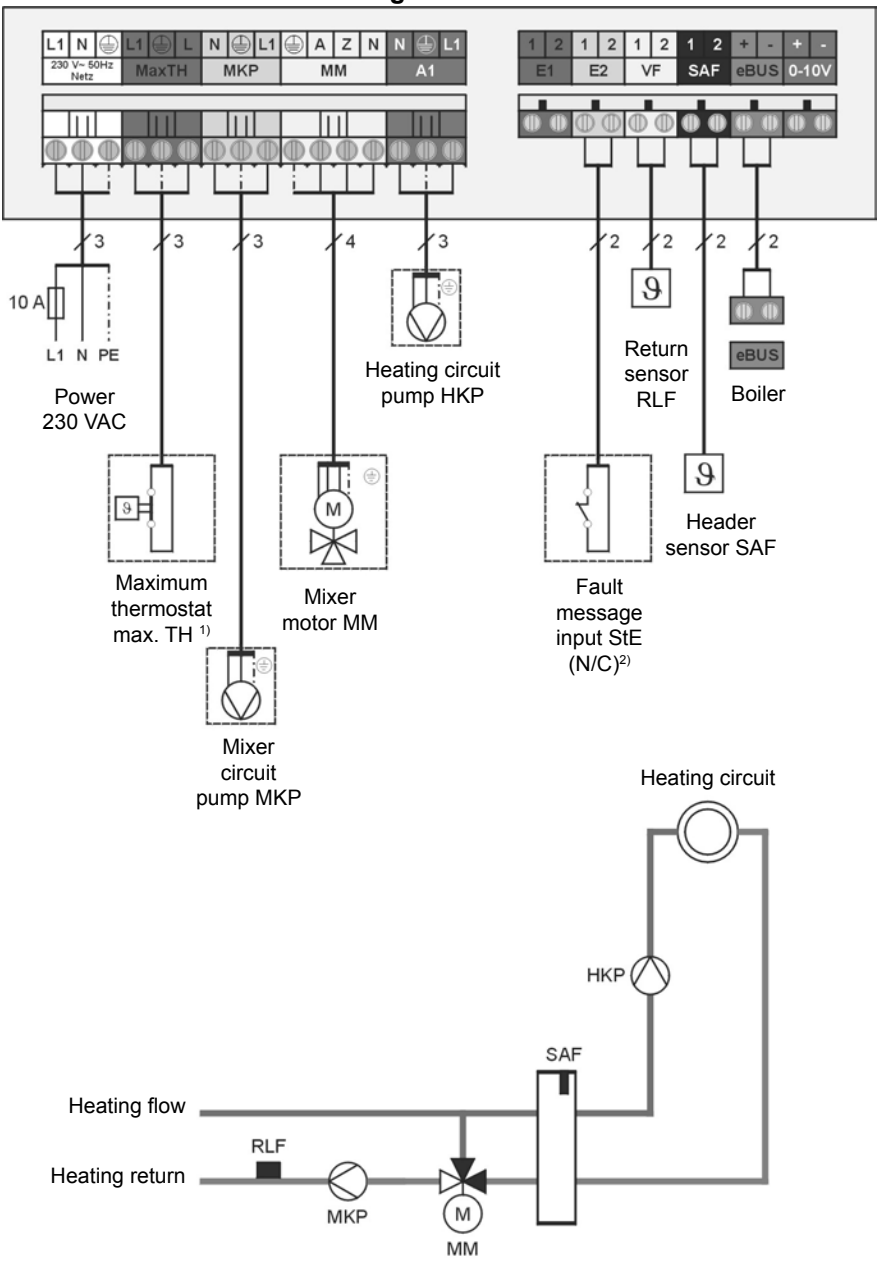
1) see description "Maximum thermostat" page 8
2) see description "Fault message input" page 8

Configuration 5: Mixer circuit and return temperature raising for central heating backup



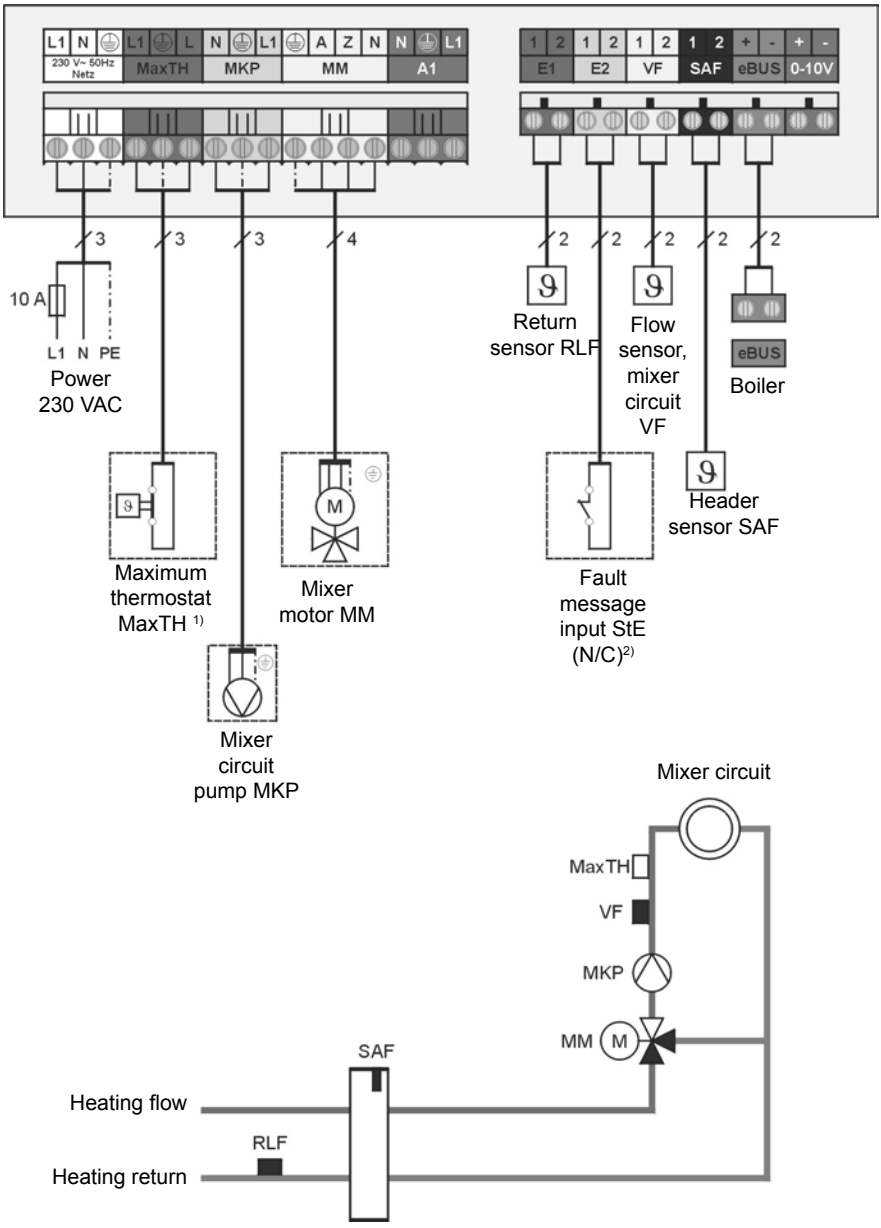
1) see description "Maximum thermostat" page 8

Configuration 6: Heating circuit and return temperature raising for soft starting



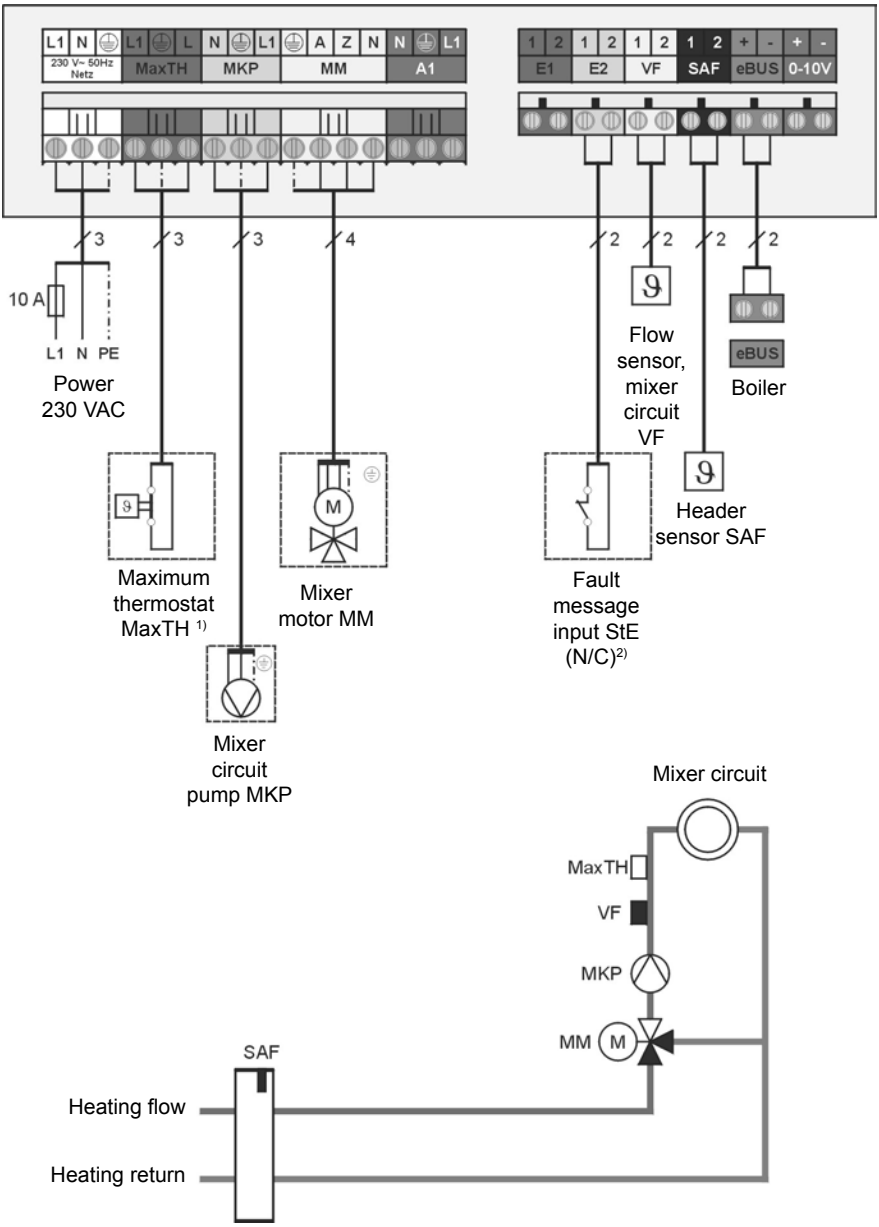
1) see description "Maximum thermostat" page 8
2) see description "Fault message input" page 8

Configuration 7: Mixer circuit with indirect return temperature raising for soft starting



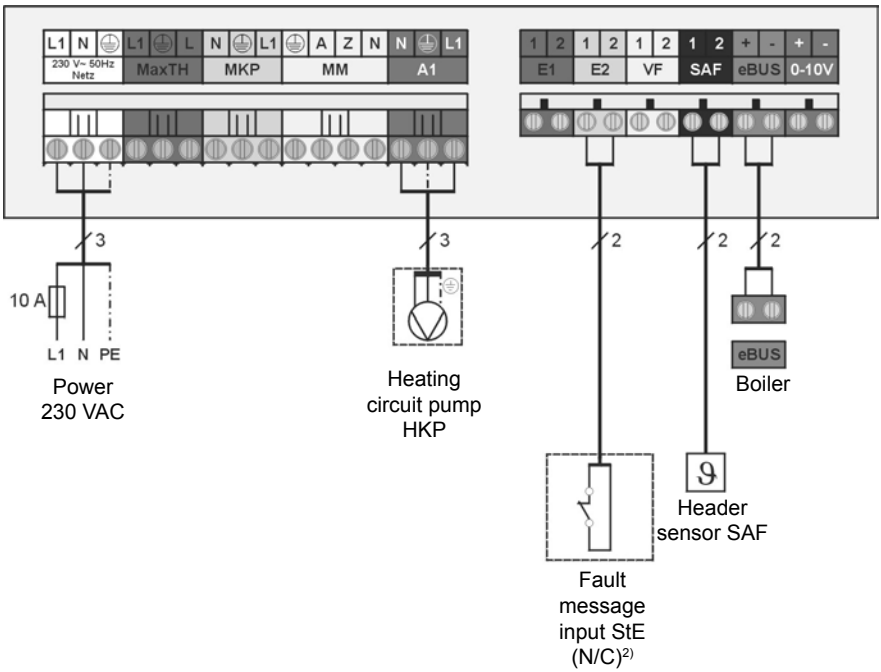
1) see description "Maximum thermostat" page 8
2) see description "Fault message input" page 8

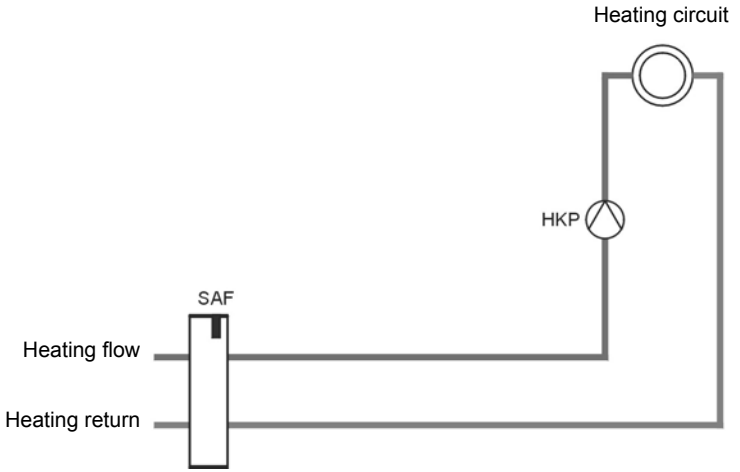
Configuration 8: Mixer circuit (factory setting)



1) see description "Maximum thermostat" page 8
2) see description "Fault message input" page 8

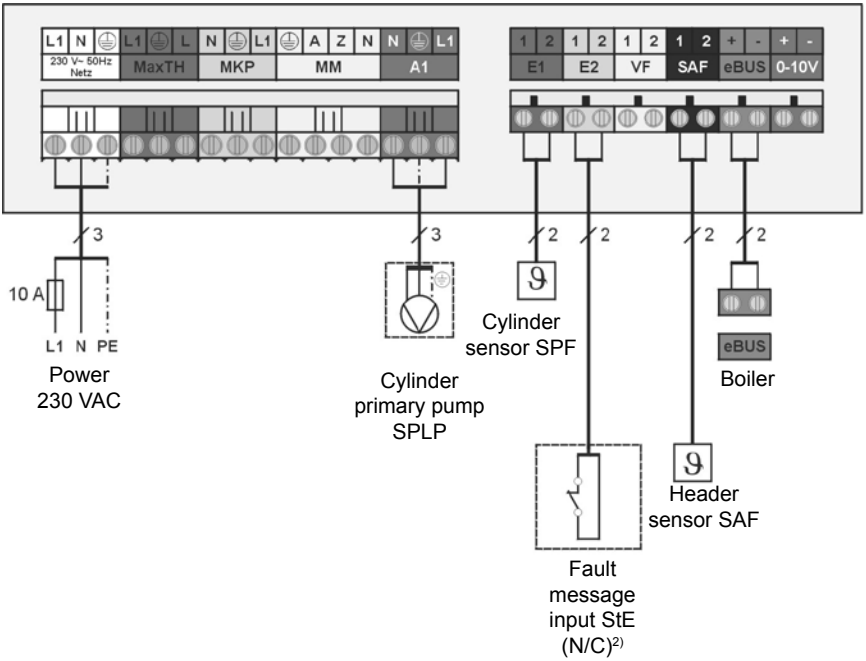
Configuration 9: Heating circuit

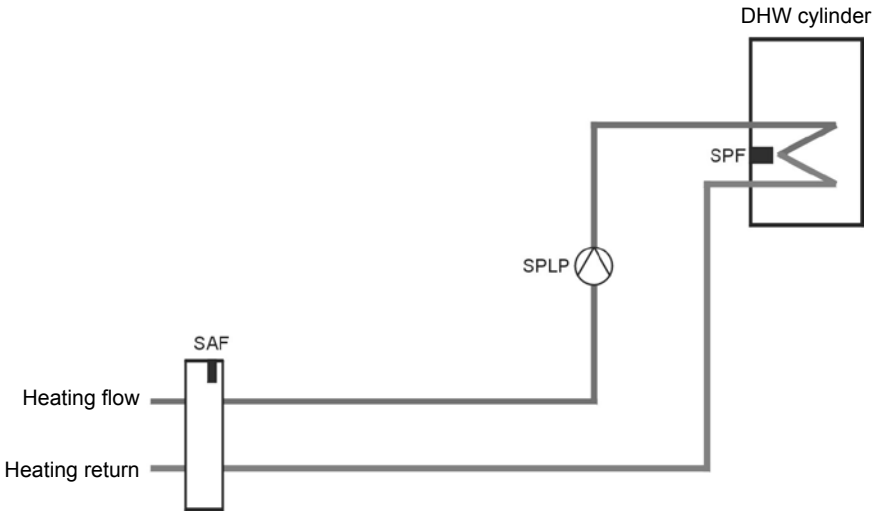




2) see description "Fault message input" page 8

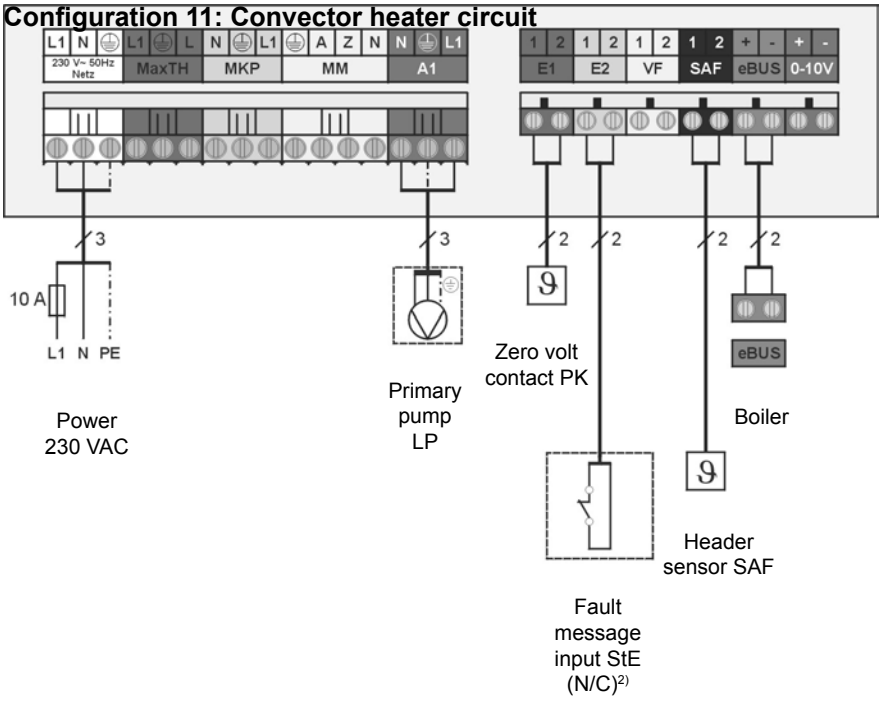
Configuration 10: Cylinder circuit

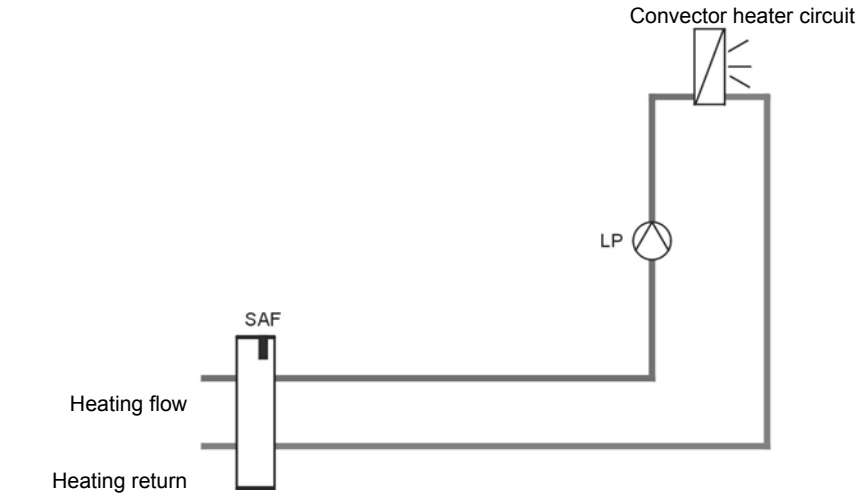




2) see description "Fault message input" page 8

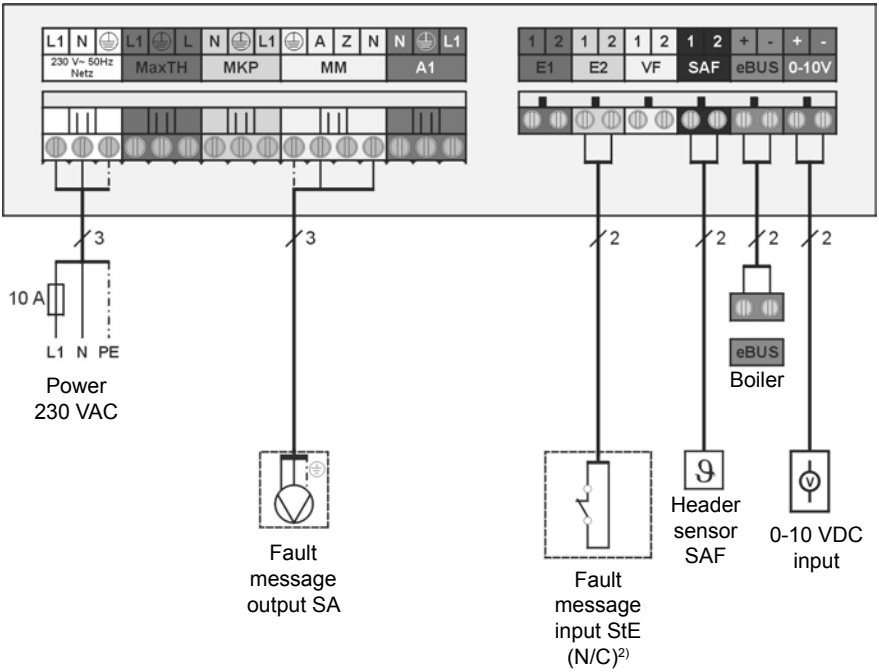
Configuration 11: Convector heater circuit





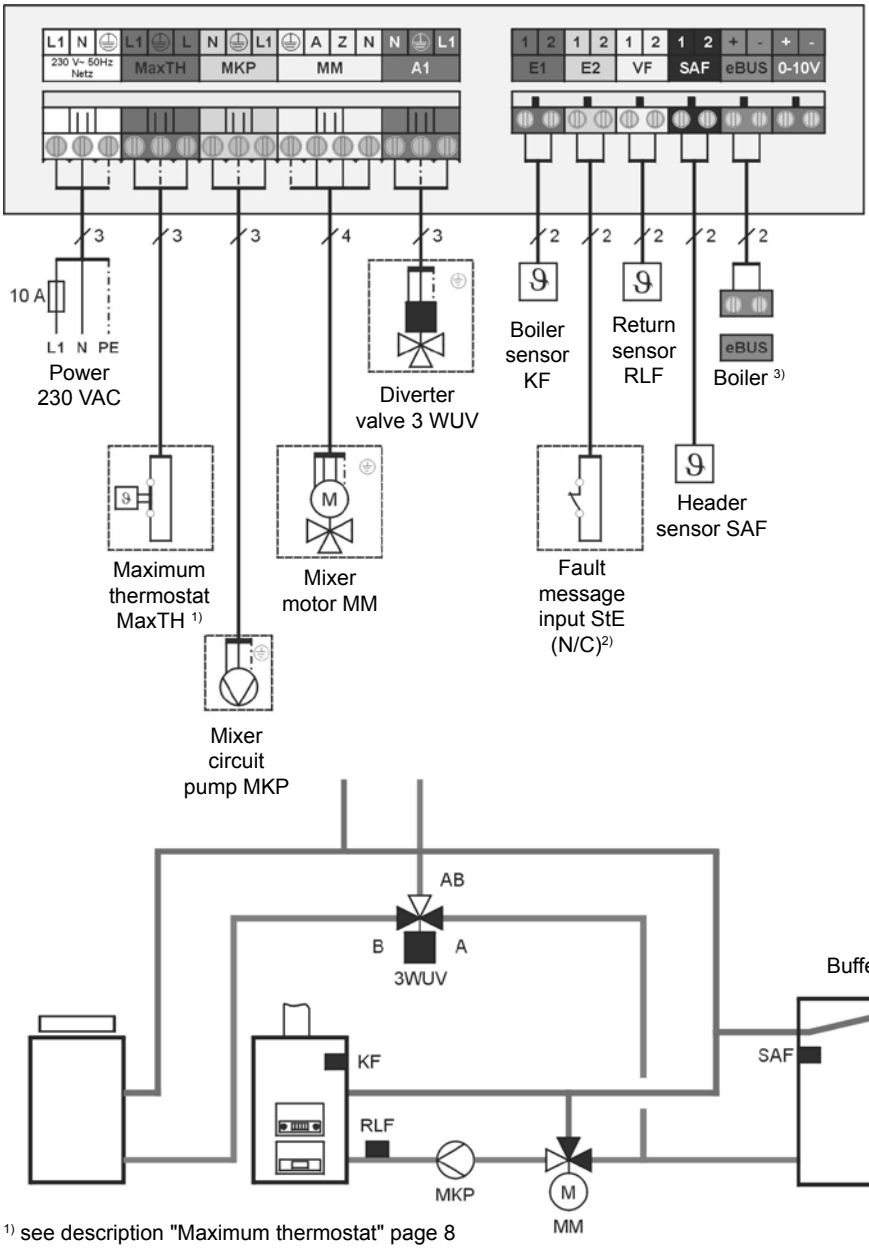
2) see description "Fault message input" page 8

Configuration 12: 0 – 10 V input for telecontrol system



2) see description "Fault message input" page 8

Configuration 13: Return temperature raising, wood burning boiler



1) see description "Maximum thermostat" page 8
2) see description "Fault message input" page 8
3) if a boiler with WOLF control system is installed

Commissioning guidelines

Implement the following steps in the order in which they are listed to achieve a successful commissioning with regards to addressing and programming all control components and the system configuration.

Note: HG, KM, MM and SOL parameters are found at control level 2 → Contractor → Boiler (HG) / Cascade (KM) / Mixer (MM) / Solar (SOL) in the BM

Step 1 → Implement the "Installation" and "Electrical connection" of all extension and programming modules in accordance with the instructions in the associated manual.

Step 2 → For further details regarding the eBUS address (DIP switches) of the extension and programming modules (KM, MM and BM), see "Setting the eBUS address of the extension and programming modules (KM, MM and BM)".

Step 3 → Start the system via the system ON/OFF switch (mains "ON").

Step 4 → For setting the eBUS address at WOLF boilers, see the details in "Setting the eBUS address for WOLF boilers".

Step 5 → Configuration of the extension modules, such as cascade module, mixer module and solar module

1. Configuration of the cascade module KM
   a) Parameter KM01 (= configuration): Here, select the configuration of the KM in accordance with the actual hydraulic connection. See "Electrical connection" regarding the selection of the correct configuration.
   b) Parameter KM02 (= mode): Select one of the following settings subject to the boiler type and the burner operating mode (par. HG 28).
      KM02 = 1 ⇒ single stage boiler
      KM02 = 2 ⇒ two-stage boiler
      KM02 = 3 ⇒ modulating boiler

2. Configuration of the mixer module MM and solar module SM2 parameter MI05 (= configuration mixer module) or parameter SOL12 (= configuration solar module): Here, you configure the mixer modules and the solar module in accordance with the hydraulic layout. See "Electrical connection" in the mixer module or solar module installation instructions regarding the selection of the correct configuration.

Step 6 →

Configuration Wolf boiler control unit COB
Parameter HG06 (pump operating mode): Select pump operating mode 1 in conjunction with Wolf boiler control unit COB. ⇒ HG06 = First description see COB control unit manual.
Note: Parameter HG06 must not be changed for Wolf control units for wall mounted boilers and MGK standard control units.

Step 7 →

Programming the following components

1. Wolf boiler control unit COB, Wolf control unit for wall mounted boilers and MGK standard control unit
   Set parameter HG22 (maximum boiler temperature) = parameter KM03 (maximum header temperature) to + 5 K.
2. BM programming module
   Set parameters such as time, day, time programs, etc.
3. Extension modules KM, MM and SM
   Match the parameters to the specific requirements.

Step 8 →

Start the system again via the system ON/OFF switch (mains "OFF/ON"). The system is ready to operate after approx. 3 min.

After the successful commissioning, the number of boilers appears on the BM below the current time.

Setting the eBUS address of the extension and programming modules (KM, MM, BM)

Setting the eBUS address of the extension and programming modules (KM, MM and BM)

Setting the eBus	
Address 0	
Address 1 (factory setting)	
Address 2	
Address 3	
Address 4	
Address 5	
Address 6	
Address 7	

Dip 1-4

Display example:
BM (factory setting)

The address of the cascade module KM remains set to 1 (factory setting). In addition to the KM, up to six mixer modules MM can be connected to a single system. The MM addresses are assigned in sequence from 2 to 7 in conjunction with the Wolf control unit for wall mounted boilers, MGK standard control unit or the Wolf boiler control unit COB.

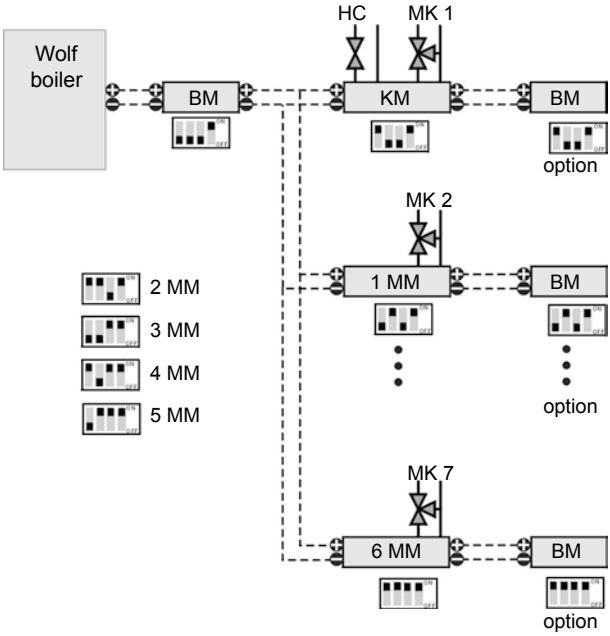
The functions of each cascade module and each mixer module are determined via the configuration settings (see also "Electrical connection").

Each system can comprise up to seven mixer circuits and one direct heating circuit. Consequently, configuration 3 or 9 may only be assigned once per system, irrespective of whether in the cascade or mixer module.

In addition to each mixer module (mixer circuit) one BM programming module can be used to provide full control.

The direct heating circuit is always regulated by the programming module with address 0.

a) max. expansion with Wolf control unit for wall mounted boilers, MGK standard controller or Wolf boiler control unit COB



The KM can also be used as stand-alone mixer circuit controller, if no boiler is installed. For this, either an outside temperature sensor must be connected to the BM (0) or a DCF receiver with outside temperature sensor must be connected to the eBUS; see also "Electrical connection/outside temperature sensor". The KM, MM and BM addresses are set in accordance with the scheme including Wolf boilers.

Setting the eBUS address for Wolf boilers

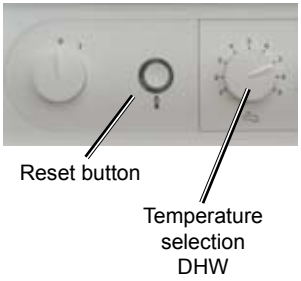
Setting of the eBUS address for Wolf boilers

When operating several boilers (number of boilers >1) in conjunction with a cascade module, set the eBUS address for each boiler in accordance with the table below.

Boiler	BUS address	Rotary selector position DHW	Illuminated ring indication
Individual boiler	0*	6	flashing green (factory setting)
1	1	1	flashing red
2	2	2	flashing yellow
3	3	3	flashing yellow/red
4	4	4	flashing yellow/green
5	5	5	flashing green/red

* Address 0 cannot be changed at the Wolf boiler control unit COB. If only one Wolf boiler control unit COB is installed in the system, then the address remains at its factory setting (address = 1).

BUS address setting



Hold down the reset button; after 5 seconds, the corresponding flashing code will be displayed (see table). Select the corresponding address with the DHW temperature rotary selector. Then release the reset button again.

The assignment of gas fired boilers or BUS addresses (1), (2), (3) and (4) must be made on-site. Allocate each BUS address only once.

Note: If only one BUS subscriber (boiler or KM) is isolated from the power supply, then stop and start all subscribers via a system switch.

Setting parameters

The standard settings for all parameters and switching times are fixed and stored in a non-volatile memory. All changes are permanently stored and will not be lost, even if the power fails for several weeks. Parameters are programmed via the BM programming module. Check the description of operation and setting / modifying parameters in the BM installation and operating instructions.

Switching times

Mixer circuit: The switching times for the mixer circuit in the cascade module are stored in the cascade module.
This is found at control level 2 → Time program → Heating system → Mixer 1
Heating circuit and cylinder: The switching times for the heating circuit and cylinder are always stored in the BM programming module.

Time mode	Block	Switching time	Mixer ON	Mixer OFF	Time mode	Block	Switching time	Mixer ON	Mixer OFF
Time prog. 1	Mo-Su	1	5:00	21:00	Time prog. 3	MON	1	4:30	20:00
		2					2		
		3					3		
	Sa-Su	1	6:00	22:00		TUE	1	4:30	20:00
		2					2		
		3					3		
Time prog. 2	Mo-Fr	1	5:00	7:00		WED	1	4:30	20:00
		2	14:00	21:00			2		
		3					3		
	Sa-Su	1	6:00	21:00		THU	1	4:30	20:00
		2					2		
		3					3		
						FRI	1	4:30	20:00
							2		
							3		
						SAT	1	4:30	20:00
							2		
							3		
						SUN	1	4:30	20:00
							2		
							3		

Parameter list Standard setting

This is found at control level 2 → Standard settings → Mixer 1

Parameters	Setting range	Factory setting	Individual setting
TEMP DAY	5 °C - 30 °C	20°C	
RED TEMP	5 °C - 30 °C	16 °C	
GRADIENT	0 - 3	0.8	
ROOM INFL	OFF - ON	OFF	
W/S SWITCH	0 °C - 40 °C	20 °C	
ECO-RED	-10 °C - 40 °C	10 °C	

Check the BM installation and operating instructions for a description of the parameters Standard temperature, Reduced temperature, Gradient, Room influence, WI / SU changeover and ECO-RED.

Parameter list Contractor system

The system parameters A09, A10, A12 and A14 can only be adjusted at the programming module with address 0. All other system parameters are adjusted at the associated programming modules.
This is found at control level 2 → Contractor → System

Parameters		Setting range	Factory setting	Individual setting
A00	Room influence	1 - 20	4	
A09	Frost protection limit	-20 - 10 °C	2	
A10	Parallel pump operation	0 - 1	0	
A11	Room temperature-dependent summer/ winter changeover	ON - OFF	ON	
A12	Setback stop	OFF, -39 °C	-16	
A14	Maximum DHW temperature	60 - 80 °C	65	

Check the description of the parameters Room influence, Frost protection limit, Pump stop with room controller, Setback stop and Maximum DHW temperature in the BM installation and operating instructions.

A10: Parallel pump operation for KM or MM

Parameter A 10 = 0: Priority mode for cylinder heating or external heat demand ahead of a heat demand for the mixer circuit output.

Parameter A 10 = 1: Parallel mode for cylinder heating or external heat demand with a heat demand for the mixer circuit output.

Note: In parallel mode, the highest possible flow temperature is applied.

Parameter list Contractor, mixer circuit in the KM This is found at control level 2 → Contractor → Mixer 1

Parameters		Setting range	Factory setting
M101	Min. mixer circuit temp	0 °C - 80 °C	0 °C
M102	Max. mixer circuit temp	20 °C - 80 °C	50 °C
M103	Heating curve gap	0 K - 30 K	10 K
M104	Screed drying	0 (OFF) - 2	0
M105	No function	-	----
M106	Run-on time, heating circuit	0 - 30 min	5 min
M107	P range, mixer	5 K - 40 K	12 K
M108	Set return temperature	20 °C - 80 °C	30 °C
M109	Max. cylinder heating time	0 - 5 h	2 h
M110	BUS feed (1 = ON)	0 (OFF) - 2 (Auto)	2
M111	Hysteresis, bypass sensor	0 °C - 30 °C	10 °C
M112	Primary pump, blocking	0 - 1	0
M113	Primary pump, run-on time	0 - 10 min	3 min
M114	Constant temperature	50 °C - 80 °C	75 °C
M115	dT OFF (stop differential)	3 - 20 K	5 K
M116	dT ON (start differential)	5 - 30 K	10 K
M117	Boiler overtemperature during cylinder heating	0 - 40 K	10 K
M118	Burner blocked during return temperature raising	0 s	0 s
M150	Test function	1 - 8	1
Display of the input sensor values			
M170	Analogue input E1	-	-
M171	Analogue input E2	-	-
M172	Analogue input, flow sensor	-	-

Parameter list
Contractor cascade

This is found at control level 2 → Contractor → Cascade

Parameters		Setting range		Factory setting	Individual settings
KM01	Configuration	1	13	8	
KM02	Mode (single stage = 1; two-stage=2; modulating = 3)	1	3	3	
KM03	Maximum header temperature	50 °C	85 °C	85 °C	
KM04	Maximum flow temperature, central heating	40 °C	85 °C	75 °C	
KM05	Minimum header temperature	20 °C	70 °C	20 °C	
KM06	Set hysteresis - header temperature	2 K	20 K	5 K	
KM07	Off-periods	0 min	30 min	5 min	
KM08	STD up to the boiler sequence change	10 h	2000 h	200 h	
KM09	1/Kp header temperature control start	20 K/%	500 K/%	100 K/%	
KM10	1/Kp header temperature control stop	20 K/%	500 K/%	100 K/%	
KM11	Tn header temperature control	5 s	500 s	50 s	
KM12	Selection, boiler sequence	[AbCd]		d	
KM13	Boiler sequence A	[12345]	[54321]	[12345]	
KM14	Boiler sequence B	[12345]	[54321]	[54321]	
KM15	Shutdown modulation level	10%	60%	30%	
KM16	Start-up modulation level	70%	100%	80%	
KM17	DHW circulation pump	0	3	0	
KM18	Pump control lead boiler	0	1	0	
KM19	Modulation stop	0	1	0	
KM20	Hysteresis, modulation stop	10 K	50 K	10 K	
KM21	Forced output for cylinder heating	0	1	0	
KM22	Hysteresis, parallel operation	0 K	20 K	5 K	
KM23	Pump speed control WZ	0	1	0	
KM24	Min. flow temperature WZ	40 °C	80 °C	65 °C	
KM25	Max. spread WZ	10 K	50 K	40 K	
KM26	P range, pump	5 K	40 K	15 K	
KM27	Set boiler water temperature	20 °C	80 °C	60 °C	
KM28	Hysteresis, set boiler water temperature	2 K	30 K	10 K	
KM29	Set buffer temperature	20 °C	80 °C	60 °C	
KM30	Hysteresis, set buffer temperature	2 K	30 K	10 K	
KM31	Operating mode 0 -10 V input	1	2	1	
KM50	Test function	1	5	1	

Display					
KM60	Control deviation	-	-	-	-
KM61	Overall modulation level	-	-	-	-
KM62	Modulation level, boilers	-	-	-	-
KM70	E1	-	-	-	-
KM71	E2	-	-	-	-
KM72	VF	-	-	-	-
KM73	SAF	-	-	-	-
KM74	0 - 10 V	-	-	-	-

With the r.h. rotary selector, choose the mixer parameter to be modified (MM..) from the contractor menu level (after entering the correct code).

The mixer parameter to be modified (MM..) is changed by pressing (display indication flashes) and then turning the r.h. rotary selector. After setting the mixer parameter to be modified (MM..), pressing the r.h. rotary selector again confirms the setting.

Pressing the Info pushbutton returns the standard display.

MI 01 minimum mixer circuit temperature

This minimum mixer circuit temperature limits the low end of the set mixer circuit flow temperature.

MI 02 maximum mixer circuit temperature

The maximum mixer circuit temperature limits the set flow temperature of the mixer circuit upwards, for example to prevent damage to floor coverings.
This does not replace the maximum thermostat for pump shutdown.

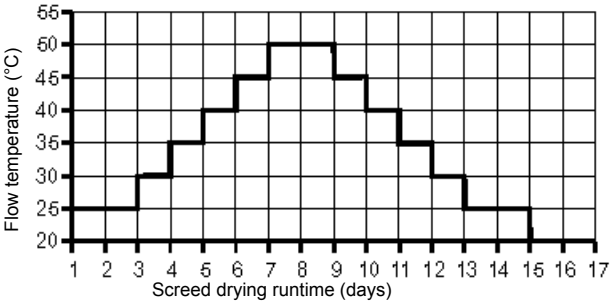
MI 03 Heating curve gap

The heating water temperature will be raised by the set value against the mixer circuit temperature.

MI 04 Screed drying

If an underfloor heating system is started for the first time in new buildings, the set flow temperature may, as an option, be controlled independent of the outside temperature either to a constant value or to control the set flow temperature in accordance with an automatic screed drying program.
If this function has been enabled (setting 1 or 2), it can be terminated by resetting parameter *MI 04* to 0.
MI 04 = 0 without function
MI 04 = 1 constant temperature mixer circuit
The mixer circuit is heated to the set flow temperature. The set flow temperature is permanently set to the temperature selected in parameter *MI 01*.
MI 04 = 2 screed drying function
For the first two days, the set flow temperature will remain constant at 25 °C. It will then be automatically raised every day (at 0:00 h) by 5 °C up to the maximum mixer circuit temperature (MI 02). That temperature will then be held for two days. Subsequently, the flow temperature is automatically reduced again in 5 °C steps per day to 25 °C. The program sequence is terminated after a further two days.

Fig.:
Flow temperature progress over time during screed drying



NB:
Agree the time sequence and the maximum flow temperature with the screed contractor, otherwise the screed may be damaged, particularly through cracking.
The screed drying program continues after a power failure. The remaining time in days is displayed at the BM.

MI 06 Mixer circuit pump run-on time

The mixer circuit pump / heating circuit pump will run on according to the set value after the mixer circuit / heating circuit has been switched OFF.

MI 07 Mixer circuit proportional range

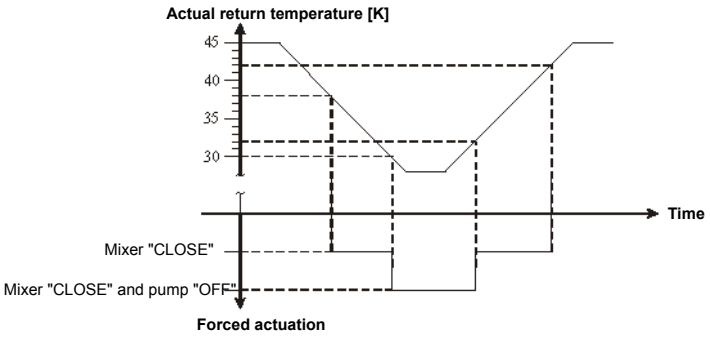
Subject to application, the mixer circuit controller can be configured for the mixer circuit in the heating flow or for the mixer circuit for return temperature raising. The mixer circuit temperature is regulated to the set value by means of the mixer circuit sensor / return temperature sensor (mixer circuit in the heating flow / mixer circuit for raising the return temperature) via terminal VF and a motorised mixer. The output of the mixer controller for regulating the mixer motor features P characteristics. The P range can be adjusted for each parameter "Proportional range, mixer".
The impulse duration (= activation of mixer motor) is directly proportional to the mixer flow deviation (ΔT = Set - Actual). Parameter *MI 07* determines the temperature deviation, for which the pulse duration is 100%. Outside this range the mixer is either not regulated at all (ΔT < 1 K) or is regulated constantly (ΔT > as setting for par. *MI 07*) headed for. Within the temperature range, the system exerts constant control. Adjust the proportional range so that stable regulation is ensured. This depends on the runtime of the mixer motor. For mixer motors with a short runtime, select a wide proportional range and vice versa for mixer motors with longer runtimes, select a narrower proportional range.
Setting information: These settings are only approximate guidelines.
Change factory settings only where required.

Mixer runtime in min.	2 - 3	4 - 6	7 - 10
Temperature window in K *MI 07*	25 - 14	15 - 9	10 - 5

MI 08 Set return temperature

Configuration *KM 01* = 7
The return temperature is permanently monitored. If the return temperature falls too low, all mixers will be forced to raise the return temperature.
Falling return temperature:
RL_ist < RL_Set + hysteresis, return temperature ⇒ all mixers towards "CLOSE"
RL_ist < RL_Set ⇒ mixer towards "CLOSE" and all heating circuit and cylinder primary pumps "OFF"
Rising return temperature:
RL_ist < RL_Set + 2 K ⇒ all mixers towards "CLOSE"
RL_ist < RL_Set + hysteresis, return temperature + 4 K ⇒ no forced output
Hysteresis, return temperature = 8 K

Example of a set return temperature = 30 °C:



MI 09
max. cylinder heating time

Cylinder heating is deemed to have been completed when the actual cylinder temperature is ≥ set cylinder temperature. Fault code 52 is issued and the control unit switches over to heating mode for the "Max. cylinder heating time", if cylinder heating is not completed within the max. cylinder heating time (this does not apply to the status heating = summer mode). This cycle continues until the actual cylinder temperature is ≥ set cylinder temperature or parameter *MI 09* is set to 0.

MI 10 BUS feed

MI 10 = 0: BUS feed "OFF", i.e. the BUS feed is always switched OFF.
MI 10 = 1: BUS feed "ON", i.e. the BUS feed is always switched ON.
MI 10 = 2: BUS feed “AUTO”, i.e. the cascade module automatically switches the BUS feed ON or OFF.

MI 11 Hysteresis bypass sensor

Has no function in the cascade module

MI 12 Primary pump block

For starting the primary pump, cylinder primary pump (configuration 1, 4 and 10)
Or for ext. heat demand (configuration 2 and 11),
we differentiate between two cases:

a) Par. *MI 12* = 0: The primary pump is started immediately after the demand is issued.

b1) Par. *MI 12* = 1 with configuration 1, 4 and 10:
Primary pump "ON": Primary pump “ON”: actual header temperature > actual cylinder temperature + 5 K

Primary pump "OFF": Actual header temperature ≤ actual cylinder temperature + 2 K

b2) Par. *MI 12* = 1 with configuration 2 and 11:

Primary pump "ON": Primary pump “ON”: Actual header temperature > Constant temperature - 5K

Primary pump "OFF": Primary pump “OFF”: Actual header temperature > Constant temperature - 8 K

MI 13 Primary pump run-on time

The primary pump run-on starts after cylinder heating or ext. heat demand has been terminated (configuration 1, 2, 4, 10 and 11).

MI 14 Constant temperature

The system regulates to the selected set flow temperature, and output A1 is regulated in case of an external heat demand via a zero volt contact at input E1 and parameter configuration = 2 or 11. External heat demand takes priority over any heat demand from the heating circuits. The primary pump run-on starts after the external heat demand has terminated. The program selector and time slot heating or DHW have no influence.

MI 15 dTAus (stop differential)

Configuration *KI 01* = 5
Configuration 5 comprises a mixer circuit control and a dT control for central heating backup. Condition for central heating backup, see parameter description *MI 18*.
Output 1 ON, if PF_ist > RLF_ist + dTEin
Output 1 OFF, if PF_ist < RL_ist + dTAus

MI 16 dTEin (start differential)

See "*MI 15* = dTOFF (stop differential)"

MI 17 Boiler excess temperature during cylinder heating

Cylinder heating starts when the actual cylinder temperature < set cylinder temperature - 5 K. The set flow temperature then results from the set cylinder temperature + excess boiler water temperature during cylinder heating.

MI 18 Burner blocked in case of return temperature raising

Configuration *KM 01* = 5
For raising the return temperature during central heating backup, a three-way diverter valve is controlled to raise the heating return temperature via a buffer cylinder that has been heated up.

When the KM is operated as part of the Wolf control system WRS, the boilers are blocked when the start conditions have been met. If a demand is issued by at least one heating circuit or one DHW cylinder, the three-way diverter valve will be controlled, and the blocking time set in parameter *MI 18* starts (= time for burner blocking). The burner will be enabled again after the blocking time has expired. When the start condition has been met whilst the burner is already enabled, it will be disabled for the set time.

Start condition: PF_ist (E1) > RLF_ist (E2) + dTEin (*MI 16*)
Stop condition: PF_ist (E1) < RLF_ist (E2) + dTAus (*MI 15*)

When setting a blocking time of 0 s (*MI 18*) the three-way diverter valve will be controlled independent of a heat demand.

MI 50 Test function

Parameter *MI 50* enables control over individual relays.
MI 50 = 1 ⇒ Control, mixer circuit pump relay MKP
MI 50 = 2 ⇒ Control, mixer motor relay "OPEN" MM
MI 50 = 3 ⇒ Control, mixer motor relay "CLOSE" MM
MI 50 = 4 ⇒ Control, output relay A1

Note: Only contractors should adjust the KM parameters.

With the r.h. rotary selector, choose the cascade parameter to be modified (KM..) from the contractor menu level (after entering the correct code).

The cascade parameter to be modified (KM..) is changed by pressing (display indicator flashes) and then turning the r.h. rotary selector. After setting the cascade parameter to be modified (KM..), pressing the r.h. rotary selector again confirms the setting.

Pressing the Info pushbutton returns the standard display.

KM 01 Configuration

The corresponding configuration may, subject to the application of the KM, have to be selected. Up to 13 configurations can be selected. corresponding wiring diagrams, see under "Electric connection". Adjust the configuration during commissioning.

Configuration 01:	Mixer circuit and cylinder circuit
Configuration 02:	Mixer circuit and convector heater circuit
Configuration 03:	Mixer circuit and heating circuit
Configuration 04:	Cylinder circuit and third party boiler control
Configuration 05:	Mixer circuit and return temperature raising for heating backup
Configuration 06:	Heating circuit and return temperature raising for soft starting
Configuration 07:	Mixer circuit with indirect return temperature raising for soft starting
Configuration 08:	Mixer circuit (factory setting)
Configuration 09:	Heating circuit
Configuration 10:	Cylinder circuit
Configuration 11:	Convector heater circuit
Configuration 12:	0 – 10 V input for telecontrol system
Configuration 13:	Return temperature raising, wood burning boiler

KM 02 Mode

Only operate boilers of the same type in a single cascade, i.e. either modulating, single stage or two-stage boilers. Adjust the configuration during commissioning.

KM 02 = 1 ⇒ single stage boiler
KM 02 = 2 ⇒ two-stage boiler
KM 02 = 3 ⇒ modulating boiler (factory setting)

KM 03 Maximum header temperature

The "Maximum header temperature" parameter limits the set header temperature upwards.

KM 04 Maximum flow temperature

The "Maximum flow temperature" parameter limits the set header temperature of the heating circuits (mixer circuits and direct heating circuits) upwards. Parameter *KM 03* takes priority.

KM 05 Minimum flow temperature

The "Minimum header temperature" parameter limits the set header temperature downwards.

KM 06 Hysteresis header temperature

If only one boiler/burner stage is still in operation, that boiler/ burner stage will be shut down if the following applies: Actual header temperature > set header temperature + hysteresis.

KM 07 Blocking time

A blocking time is provided that prevents further boilers/heating stages from being started, to prevent boilers/heating stages frequently cycling ON and OFF. An additional boiler/burner stage can only be started after the blocking time has expired. This blocking time does not apply to the lead boiler, if there is a DHW demand or convector heater demand from the cascade or mixer modules.

KM 08 Hours until a boiler sequence change

After the adjustable burner hours run figure has expired, the current lead boiler changes, if parameter *KM 08* "Setting C" has been selected, the boiler sequence between A and b; when "Setting d" has been selected, the next boiler in rotation becomes the lead boiler. That boiler is lead boiler, whose cascade module is switched ON first in the cascade and is shut down last. Precondition for an automatic changeover of boiler sequence is the selection of a boiler sequence (parameter *KM 12*) = C or d.
The internal hours run meter for the boiler sequence changeover is saved daily (0:00 h) to a non-volatile memory. The last value saved is downloaded in case of power failure. Any reset at the KM (= loading standard values) returns the internal hour count to zero.

KM 09 1/Kp header temperature control start

Setting the P portion of the PI controller for header temperature.
Parameter value *KM 09* increase ⇒
header temperature control responds more slowly
Parameter value *KM 09* reduce ⇒
Header temperature control responds more quickly

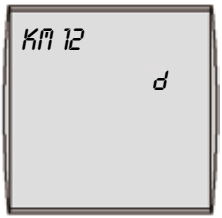
KM 10 1/Kp Header temperature control stop

Setting the P portion of the PI controller for header temperature.
For a description, see parameter *KM 09*

KM 11 Tn Header temperature control

Setting the I portion of the PI controller for header temperature.
Parameter value *KM 11* increase ⇒
header temperature control responds more slowly
Parameter value *KM 11* reduce ⇒
header temperature control responds more quickly

KM 12 Selection boiler sequence



Factory setting: d
Setting range: A, b, C, d
Individual settings: _____

The boiler sequence (**A, b, C, d**) is selected with the “Selection boiler sequence” parameter.

Setting A:
The boiler sequence selected under "Boiler sequence **A**" applies.
Setting b:
The boiler sequence selected under "Boiler sequence **b**" applies.
Setting C:
Automatic change of boiler sequence A and b (see parameter *KM 08*).
Setting d:
Every boiler automatically becomes lead boiler in rotation after expiry of parameter *KM 08*.
The boiler sequence is determined by assigning the BUS addresses.

Every boiler in the cascade has its individual BUS address (1 to 4). The cascade module automatically recognises the number of connected boilers.
The sequence in which boilers are started and shut down is selected by boiler sequence **A** (parameter *KM 13*) or by boiler sequence **b** (parameter *KM 14*).
For this, see "Setting the eBUS address for Wolf boilers"

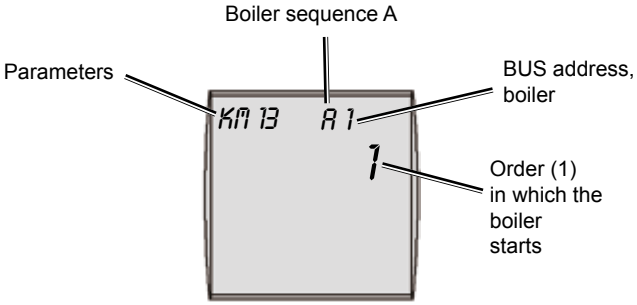
KM 13 Boiler sequence A

The boiler sequence is changed [1, 2, 3, 4, 5] (factory setting) with the "Boiler sequence **A**" parameter.

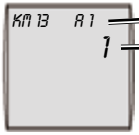
KM 14 Boiler sequence b

The boiler sequence is changed [5, 4, 3, 2, 1] (factory setting) with the "Boiler sequence **b**" parameter.

Description and example of KM13



The setting of the boiler sequence is illustrated using two boilers as example.



Select parameter KM 13
Select boiler sequence A with boiler address 1
Order boiler address 1

R.h. rotary selector press at the programming module

Order boiler address 1 flashes

R.h. rotary selector turn at the programming module

Order boiler address 1 change from 1 to 2

R.h. rotary selector press at the programming module

Saving the new boiler sequence

R.h. rotary selector turn at the programming module

Select boiler sequence A with boiler address 2

R.h. rotary selector press at the programming module

Order boiler address 2 flashes

Turn the r.h. rotary selector on the programming module

Order boiler address 1 change from 2 to 1

R.h. rotary selector press at the programming module

Saving the new boiler sequence

Note: The sequence of all boilers must be matched if the sequence of one boiler is changed.

KM 15 Modulation level, stop

and

KM 16 Modulation level, start

a) For modulating boilers (KM 02 = 3)

Starting boilers:
Boiler 1 is started when the overall modulation level is > 0. An additional boiler is started, subject to the boiler sequence, if the set modulation level of the active boilers exceeds the programmed starting level (modulation level, start) and the blocking time has expired. In this case, the blocking time will be invoked.

Shutting boilers down:
An additional boiler is started, subject to the boiler sequence, if the set modulation level of the active boilers exceeds the programmed starting level (modulation level, start) and the blocking time has expired. If only one boiler is still in operation, that boiler will be shut down if the actual header temperature > set header temperature + hysteresis.

Soft start phase:
Soft start only applies to the lead boiler and not to the starting of additional boilers. It also applies if only one boiler is connected to the KM. Once the blocking time has expired and the overall modulation level > 0, the parmeter value "Modulation level, stop" will be transferred to the lead boiler within the first three minutes. Soft start ends after the expiry of three minutes or after the actual header temperature > set header temperature + header temperature hysteresis. The factory setting of 30% relates to boilers with a modulation range of 30 - 100%.

Additional information regarding the cascade algorithm for modulating boilers in conjunction with configuration 12 and parameter KM 31 = 1

In this case, the following functions do not apply:
a) Shutdown conditions for an additional boiler, if the "actual header temperature > set header temperature + 1 K".
b) Shutdown condition of the lead boiler if the "actual header temperature > set header temperature + header temperature hysteresis".
c) No soft start

b) For single stage boilers
(KM 02 = 1; KM 15 and KM 16 exert no influence)

Starting boilers:
Boiler 1 is started when the overall modulation level is > 0.
An additional boiler will be started if the internal algorithm from the resulting overall modulation level calculates that an additional output stage should be started and the blocking time has expired. In this case, the blocking time will be invoked.
Shutting boilers down:
The boiler started last will be stopped when the internal algorithm from the resulting overall modulation level has calculated that an output stage should be shut down or if the set temperature has been exceeded by 1 K. In this case, the blocking time will be invoked. An additional boiler will be shut down if the internal algorithm from the resulting overall modulation level calculates that an output stage should be shut down.
The final boiler will be shut down when the actual header temperature > set header temperature + header temperature hysteresis.
Soft start phase:
Soft start only applies to the lead boiler and not to the starting of additional boilers. It also applies if only one boiler is connected to the KM. Once the blocking time has expired and the overall modulation level > 0, the I portion will be blocked for the calculation of the overall modulation level within the first three minutes. Soft start ends after the expiry of three minutes or after the actual header temperature > set header temperature + header temperature hysteresis.

c) For two-stage boilers (KM 02 = 2; KM 15 and KM 16 exert no influence)

With two-stage boilers, the second stage is treated as if it were a boiler in its own right that is always started after stage 1 and is always shut down prior to stage 1 of that boiler.

Load split for two-stage boilers:
Stage 1 = 67%
Stage 2 = 33%

Soft start phase:
"See single stage boilers"

Additional information regarding the cascade algorithm for single stage and two-stage boilers in conjunction with configuration 12 and parameter KM 31 = 1

In this case, the following functions do not apply:
a) Shutdown condition for the boiler started last, if the "actual header temperature > set header temperature + 1 K".
b) Shutdown condition of the lead boiler if the "actual header temperature > set header temperature + header temperature hysteresis".
c) no soft start

KM 17 DHW circulation pump

Connecting a DHW circulation pump to the KM only works in conjunction with configuration 04 at the KM.
The DHW circulation pump will only be enabled if the cylinder primary pump has been enabled via the "Cylinder heating" time slot.
Operating modes of the DHW circulation pump:
KM 17 = 0: DHW circulation pump always "OFF"
KM 17 = 1: DHW circulation pump always "ON"
KM 17 = 2: DHW circulation pump 5 min "ON" and 5 min "OFF"
KM 17 = 3: DHW circulation pump 2 min "ON" and 8 min "OFF"

KM 18 Pump control, lead boiler

KM 18 = 0: pump control, lead boiler "OFF"
KM 18 = 1: pump control, lead boiler "ON"

The feed pump of the lead boiler is controlled if at least one heating circuit or one primary pump in the system is active, even if the boiler modulation level (KM 62) = 0.
The lead boiler feed pump is not controlled if the heating system is in standby mode.

KM 19 Modulation stop

and

KM 20 Hysteresis modulation stop

For the following system types, the temperature change in the boilers is captured very late by the header sensor:

a) Cascade system without low loss header and boilers with low water content.

b) Cascade systems comprising boilers with large water content and soft starting enabled.

c) Low flow rate in low load operation

This results in additional boilers being started because of the remaining temperature differential between the actual and set header temperatures. After a delay this results in an excessive temperature rise at the header sensor, leading the cascade controller to shut down the entire cascade system. To prevent such control characteristics, enable the "Modulation stop" function, parameter KM 19.

KM 19 = 0: Modulation stop "OFF" ⇒ Cascade algorithm no influence.

KM 19 = 1: Modulation stop "ON" ⇒ Start enable/start disable for the lead boiler and disable/enable the I portion of the overall modulation.

Start enabling/start blocking for the lead boiler:

- Start enabling:
  Boiler temperature, lead boiler >
  actual header temperature + hysteresis, modulation stop
- Start enabling:
  Boiler temperature, lead boiler <
  actual header temperature + 5 K

Hysteresis modulation stop KM 20 adjustable from 10 K to 50 K.

Blocking/Enabling I portion, overall modulation:

- Blocking I portion:
  Boiler water temperature[1] >
  actual header temperature + hysteresis, modulation stop
- Enabling I portion:
  Boiler water temperature[1] <
  actual header temperature + 5 K

[1] Boiler that was started last.

Note: The "Cascade controller stop" function should only be enable if no cylinder is connected to boiler with address 1. For systems without low loss header, e.g. systems that are operated on the inlet side, also enable the "Pump control, lead boiler" function.

KM 21 Forced output for cylinder heating

and

KM22 Parallel mode hysteresis

For systems where the overall output of all boilers was not sized for peak loads in parallel operation of central and DHW heating, there remains the possibility that the required set header temperature is not achieved during cylinder heating at peak load times. To prevent this, the energy supply to the mixer circuits is reduced via forced output. The following conditions must be met for "Cylinder priority in parallel mode":

a) Parameter KM 21 = 1 ⇒
   "Forced output during cylinder heating" function enabled
b) and parameter "Contractor/System" A10 = 1 ⇒
   parallel mode "ON";
c) and all boilers of the cascade operational
d) and overall modulation level = 100%
e) and cylinder heating at the cascade module
   (KM 01 = 1 or 10) enabled

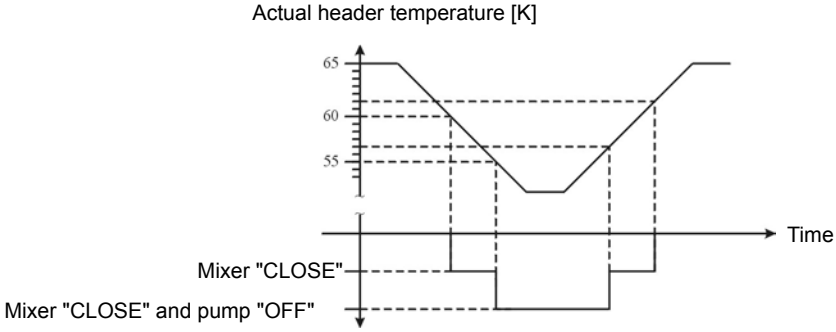
Falling header temperature:
Sa_ist ≤ Sa_Soll - hysteresis, parallel mode ⇒
all mixers towards "CLOSE".

Sa_ist ≤ Sp_soll ⇒
all mixers towards "CLOSE" and all heating circuit pumps as well as all primary pumps at the mixer modules (for cylinder and convector heaters) "OFF"

Rising header temperature:
Sa_ist > Sp_soll + 2 K ⇒
all mixers towards "CLOSE" and all heating circuit pumps as well as all primary pumps at the mixer modules (for cylinder and convector heaters) "ON"

Sa_ist ≤ Sa_Soll - hysteresis, parallel mode + 2 K ⇒
no forced output

Sample diagram: Set cylinder temperature = 55 °C
Parameter MI 17 = 10 K
Parameter KM 22 = 5 K



Forced actuation

KM 27 Set boiler value and KM 28 Set boiler value hysteresis and KM 29 Set buffer value and KM30 Set buffer value hysteresis

Configuration KM 01=13

a) Return temperature raising, wood burning boiler:

The mixer control unit (mixer, return temperature raising and mixer circuit pump) transfers the energy from the wood burning boiler into the buffer, and at the same time regulates the return temperature. The control acts like the mixer circuit control unit; see also parameter description MI 07.

Mixer circuit pump control:

Mixer circuit pump MKP "ON":
Actual (wood burning) boiler temperature (E1) > KM 27 and actual header temperature < KM 03 – 2 K

Mixer circuit pump MKP "OFF":
Actual (wood burning) boiler temperature (E1) ≤ KM 27 – KM 28 or actual header temperature > KM 03

b) Changeover between buffer and Wolf boiler by means of a three-way diverter valve (= 3WUV):

Whether the heating or cylinder circuits are supplied by the buffer or by the Wolf boiler depends on the position of the three-way diverter valve. The heating and cylinder circuit demands are exclusively issued by additional mixer modules.

Position 3WUV AB → A (= control 3WUV):
- in case of heating demand and actual header temperature > KM 29
- in case of cylinder demand[1)] and actual header temperature > set header temperature

Position 3WUV AB → B:
- heating demand ends or actual header temperature ≤ KM 29 – KM 30
- cylinder demand[1)] ends or actual header temperature ≤ set header temperature - 2 K

With outside sensor frost protection, the 3WUV always remains in position AB → B

[1)] Also applicable to cylinder frost protection

Information regarding configuration 13:

a) Without Wolf boiler and valve position AB → B ⇒ BM display "Actual header temperature = 0.0". Without a Wolf boiler, the cylinder primary pump block (parameter MI 12) must not be enabled in any MM or KM.
b) With Wolf boiler and valve position AB → B ⇒ BM display "Actual header temperature = actual boiler water temperature of the Wolf boiler".
c) If no return temperature raising is required by the KM, terminate the sensor inputs E1 and VF of the KM replacement values via resistors.
d) To ensure that the boiler circuit pump of the Wolf boiler starts when the three-way diverter valve is in position AB → B, and there is a heat demand, set parameter KM 18 to 1.

Function explained:

System configuration 4: Third party boiler control (KM 02 = 3):

Burner control (230 V) via "MKP" output, if
actual header temperature < set header temperature

Burner shutdown, if
actual header temperature > set header temperature + header temperature hysteresis

Blocking time:
The blocking time will be started after every burner start in heating mode.
Does not apply to cylinder heating and convector heater demand

KM 31 Operating mode 0 - 10 V input

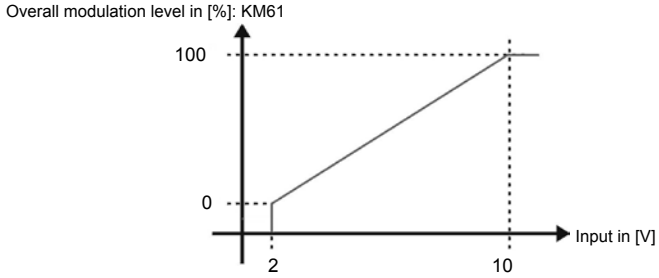
Configuration KM 01 = 12

When using system configuration 12, the external voltage signal at the 0 - 10 V input of the cascade module is used as command variable.
In addition, parameter KM 31 determines whether the command variable is used either
a) to default the modulation level (KM31=1, factory setting, or
a) to default the set header temperature (KM31=2).

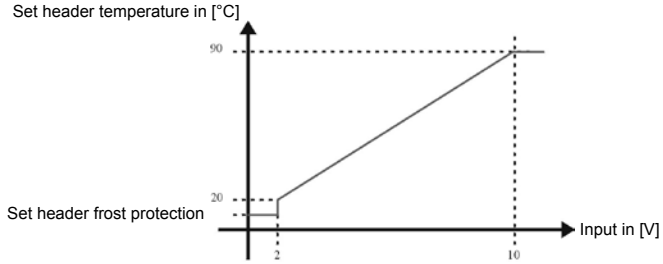
Important information regarding function and display values in the KM and BM

	KM31 = 1	KM 31 = 2
Header frost protection	no	yes
Max./min. header temperature KM 03 / KM 04	no	yes
Soft start	no	yes
Set hysteresis - header temperature	no	yes
Modulation stop KM 19 / KM 20	no	yes
Outside temperature sensor	no AF required	no AF required
Display set header temperature	5 °C if the system is set to "OFF" 99 °C in case of demand	subject to demand
Control deviation display KM 60	----	current value
Cascade control unit	see description parameter KM 15 / KM 16	

Transfer curve for KM 31 = 1



Transfer curve for KM 31 = 2



KM 50 Test function

Parameter KM50 enables the individual control of the relays.

KM50 = 1 ⇒ Control, mixer circuit pump relay MKP
KM50 = 2 ⇒ Control, mixer motor relay "OPEN" MM
KM50 = 3 ⇒ Control, mixer motor relay "CLOSE" MM
KM50 = 4 ⇒ Control, relay output A1

KM 60 Control deviation

Indicates the control deviation = set header temperature - actual header temperature.

KM 61 Overall modulation level

Indicates the overall modulation level.

No display if system configuration 13 and 4 has been selected.

KM 62 Modulation level, boilers

a) Modulating boilers, if KM 02 = 3:
Indicates the modulation level or all active boilers.

b) Single stage boilers, if KM 02 = 1:
KM 62 = 0% ⇒ no boiler active
KM 62 = 100% ⇒ boiler 1 with address 1 active

If an additional boiler is controlled, the KM 62 always shows 100%.

c) Two-stage boilers, if KM 02 = 2:
KM 62 = 0% ⇒ no boiler active
KM 62 = 50% ⇒ stage 1 of boiler with address 1 active
KM 62 = 100% ⇒ stage 2 of boiler with address 1 active

If an additional boiler/stage is controlled, the KM 62 always shows 100%.

No display if system configuration 13 and 4 has been selected.

Header frost protection

The header is protected against frost if the program selector is set to "Standby" or "Summer mode". The burner will be enabled if the header temperature falls below 5 °C. All heating circuits and primary pumps are started at the cascade module, and the set mixer circuit temperature (if a mixer circuit is installed at the KM) of the KM are regulated to a flow temperature of 40 °C. The header frost protection functions ends if the header temperature rises above 20 °C.
The frost protection of the header does not apply if system configuration 13 has been selected.

Cylinder frost protection

The set cylinder temperature is 10 °C when cylinder heating is blocked. Cylinder frost protection is activated when the actual cylinder temperature < set cylinder temperature - 5 K. The set flow temperature then results from the set cylinder temperature + parameter MI 17.

Anti-seizing pump protection

To prevent the pumps from seizing because of long idle periods, the mixer circuit pump MKP and output A1 will be activated daily for approximately five seconds (12:00 h at the cascade module) after they have been idle for more than a day.

Anti-seizing mixer protection

The mixer will be regulated to drive to "OPEN" for approx. 10 seconds daily (12:00 h at the cascade module) and then for 20 seconds to "CLOSE" to prevent the mixer from seizing up as a result of prolonged idle times; subject to configuration (KM 01) = 1/2/3/5/7/8, the mixer is driven for 10 seconds towards bypass "CLOSE" followed by 20 seconds towards bypass "OPEN". Configuration = 6/13.

Fault message input

If the jumper at the fault message input is open, FC 79 is displayed by the BM and the entire system is shut down (= no heat demand).

Emissions test

Emissions test enabled ⇒ Central heating and DHW heating are enabled until the emissions test has been completed. During the emissions test of a boiler, other heating circuits in a cascade remain OFF.

Loading the standard values (Reset)

Set DIP 4 to "OFF" and then back to "ON". The standard values are now loaded again.
All LEDs illuminate briefly as confirmation.

When KM recognises a fault, the red LED flashes and the cascade module fault code is displayed on the associated BM as well as on the central BM (address 0). The following KM faults are transmitted via the BUS and are displayed.

Fault code	Description	Cause	Remedy
FC52	Maximum DHW cylinder heating time	Max. cylinder heating time exceeded	See parameter description MI09
FC78	Header sensor faulty (terminal SAF)	Faulty sensor or lead	Check sensor and lead; replace, if required
FC70	Mixer circuit or return sensor faulty (terminal VF)	Faulty sensor or lead	Check sensor and lead; replace, if required
FC71	Cylinder, buffer, return or boiler sensor faulty (terminal E1)	Faulty sensor or lead	Check sensor and lead; replace, if required
FC79	Fault message input open or return sensor faulty (terminal E2)	Fault message input open Faulty sensor or lead	If the fault message input does not receive a signal, insert the grey 2-pole plug with jumper. Check sensor and lead; replace, if required
FC81	EEPROM fault	Parameter value outside valid range	Reset to standard values. Briefly interrupt the power supply and check settings
FC91	BUS address	Two or more accessory controllers share the same BUS address	Check address settings
---	Mixer circuit pump is not controlled	Maximum thermostat has responded (excessive flow temperature) or three-pole plug with jumper has not been set (replaces maximum thermostat)	Wait until the flow temperature has cooled down or insert three-pole plug with jumper

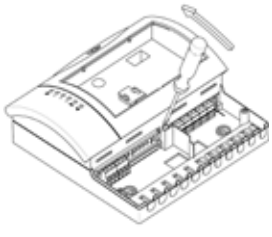
Changing a fuse: If the KM shows no function at all and there is no LED display, although power is ON, check the appliance fuse and change it, if required

Note: If the KM is operated as part of the Wolf control system, the display of one of the existing BM programming modules is retained, as this is supplied via the eBUS link to the other control components.

Prior to opening the casing, isolate the cascade module from the power supply.

How to change a fuse:

1. Isolate the unit from the power supply
2. Remove the lid from the wiring chamber by undoing both screws
3. Remove the casing top with a screwdriver
4. The fuse is located on the left on the PCB below the transformer (fine-wire fuse 5x20/6.3 A/M)



Sensor resistances

NTC
Sensor resistances

Boiler sensor, cylinder sensor, solar cylinder sensor, outside temperature sensor, flow sensor, header sensor

Temp. °C	Resist. Ω	Temp. °C	Resist. Ω	Temp. °C	Resist. Ω	Temp. °C	Resist. Ω
-21	51393	14	8233	49	1870	84	552
-20	48487	15	7857	50	1800	85	535
-19	45762	16	7501	51	1733	86	519
-18	43207	17	7162	52	1669	87	503
-17	40810	18	6841	53	1608	88	487
-16	38560	19	6536	54	1549	89	472
-15	36447	20	6247	55	1493	90	458
-14	34463	21	5972	56	1438	91	444
-13	32599	22	5710	57	1387	92	431
-12	30846	23	5461	58	1337	93	418
-11	29198	24	5225	59	1289	94	406
-10	27648	25	5000	60	1244	95	393
-9	26189	26	4786	61	1200	96	382
-8	24816	27	4582	62	1158	97	371
-7	23523	28	4388	63	1117	98	360
-6	22305	29	4204	64	1078	99	349
-5	21157	30	4028	65	1041	100	339
-4	20075	31	3860	66	1005	101	330
-3	19054	32	3701	67	971	102	320
-2	18091	33	3549	68	938	103	311
-1	17183	34	3403	69	906	104	302
0	16325	35	3265	70	876	105	294
1	15515	36	3133	71	846	106	285
2	14750	37	3007	72	818	107	277
3	14027	38	2887	73	791	108	270
4	13344	39	2772	74	765	109	262
5	12697	40	2662	75	740	110	255
6	12086	41	2558	76	716	111	248
7	11508	42	2458	77	693	112	241
8	10961	43	2362	78	670	113	235
9	10442	44	2271	79	670	114	228
10	9952	45	2183	80	628	115	222
11	9487	46	2100	81	608	116	216
12	9046	47	2020	82	589	117	211
13	8629	48	1944	83	570	118	205

Specification

Supply voltage	230 VAC (+10 / -15%) / 2A / 50 Hz
Power consumption, electronics	< 8 VA
Max. power consumption, mixer motor	30 VA
Max. power consumption per pump outlet	250 VA
0 - 10 V input: Insensitive to pole reversal and voltage resistant	up to 50 V
Protection according to DIN 60529	IP 30
Protection class according to VDE 0100	I I
Permissible ambient temperature in operation	0 to 50 °C
Permissible ambient temperature during storage	-20 to +60 °C
Data memory	EEPROM (non-volatile)
Fuse protection	Fine-wire fuse 5x20 / 6.3 A